pentoxide anodes were inserted. The units were measured with an impedance bridge and the average cathode capacitance was calculated to be 106.7 millifarads, using the formula $C_c=1/(1/C_T-1/C_A)$.

Capacitors were assembled using anodes with a target capacitance of 150 microfarads with a rated direct current working voltage of 125 volts. The total capacitance is determined by the formula C_T $1/(1/C_A+1/C_c)$. The total capacitance average was 156.26 microfarads. Again, the higher cathode capacitance did not appreciably reduce the total capacitance.

I claim:

1. An electrolytic capacitor comprising:

a tantalum case;

a tantalum anode;

a dielectric layer on the anode;

an electrolyte in contact with the dielectric layer on the anode;

a layer of tantalum carbide on an inner surface of the case;

a layer of activated carbon between the layer of tantalum carbide and the electrolyte;

an insulating header in an open end of the case and electrically isolating the anode and the case;

a riser extending through the header and attached to a first lead;

a non-conductive gasket inside the case between the electrolyte and the header surrounding a portion of the anode not in contact with the electrolyte; and

a second lead of opposite polarity from the first lead, the second lead being attached to the case.

2. The capacitor of claim 1 wherein the electrolyte is a liquid electrolyte.

3. The capacitor of claim 1 wherein the electrolyte is a gel electrolyte.

4. The capacitor of claim wherein the gasket has a elastomer seal on the periphery of the gasket.

5. A capacitor comprising:

an anode;

a dielectric layer on the anode;

an electrolyte adjacent to the dielectric layer;

a metal case surrounding the anode;

an interface carbide layer on an inner surface of the case formed by heating graphite in contact with the case to an elevated temperature in the substantial absence of oxygen; and

a layer of activated carbon on the side of the interface layer away from the case, the activated carbon being in contact with the electrolyte.

6. The capacitor of claim 5 wherein the electrolyte is a liquid electrolyte.

7. The capacitor of claim 5 wherein the electrolyte is a gel electrolyte.

8. The capacitor of claim 5 wherein the elevated temperature is in the range of from about 1,000 °C to about 1,500 °C.

9. The capacitor of claim 5 further comprising a cup-shaped cylindrical case having two ends, and an open end being closed by a header with the anode projecting through the header.

Abstract

An improved tantalum-carbon capacitor employs activated carbon in place of expensive

metals to achieve a large surface area, and therefore higher capacitance, but at substantially lower cost than can be achieved using expensive metals to increase surface area.